CASE REPORT

CIRRHOSIS IN A DOG

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Introduction

There are many cases of hepatic cirrhosis in the dog which may be manifested clinically by signs of anorexia, vomition, weakness, dullness, abdominal hypersensitivity, polydypsia and sometimes icterus and ascites (2). Treatment in cases of hepatic cirrhosis in the dog is often unrewarding because the disease is in an advanced stage. The purpose of this case report is to describe a case of hepatic cirrhosis of unknown etiology in a dog recording the history and clinical features, clinical pathology, and the gross and histopathological lesions observed at post mortem.

History

A four-year-old Doberman bitch had whelped a litter of five pups in August 1970. Two pups died shortly after birth and the other three were raised uneventfully. After weaning, the bitch developed intermittent anorexia, and lost weight gradually over a period of about seven months. Correction of a poor diet with vitamin-mineral supplementation had brought a temporary improvement. In the last week of May 1971, the dog became acutely ill with marked icterus, anorexia and polydypsia, and was referred to the hospital of the Ontario Veterinary College on June 7, 1971.

Clinical Examination

On admission, the dog appeared depressed, was thin (50 lbs) (22.7 Kg), dehydrated and had a dry, dull hair coat. The mucous membranes were intensely icteric. The dog had a pendulous abdomen with a fluid wave and pain was elicited on deep palpation of the anterior abdomen. No abnormalities were found on ascultation of the lungs but there was a grade three systolic heart murmur. The rectal temperature was 100.5°F (38°C). No other physical abnormalities were detected.

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Diagnostic Procedures

The abdomen was radiographed and a total of 2,500 ml of ascitic fluid was removed from the peritoneal cavity by means of a slow water-vacuum aspiration apparatus (11). Current cytological and biochemical examinations were done on blood, urine and ascitic fluid as clinico-pathologic investigations.

Results

The pertinent clinical pathological values for blood cells, urine, ascitic fluid and blood analysis are presented in Tables I to IV.

Radiology

Abdominal radiographs revealed a gas filled upper small intestine and fecal impaction of the lower large intestine. The kidneys were not well outlined. The liver appeared to be shrunken and of increased density.

TABLE I

HEMATOLOGIC PARAMETERS OF A FOUR-YEAR-OLD DOBERMAN BITCH WITH ICTERUS AND ASCITES JUNE 8

Hemoglobin (Hb) (gm%)	18.4
Packed Cell Volume (PCV) %	54
Erythrocyte Sedimentation Rate (ESR) (mm/hr)	0
White Blood Cell Count (WBC) (mm^3)	10,500
Neutrophils (%)	79
Bands (%)	2
Lymphocytes (%)	14
Monocytes (%)	4
Eosinophils (%)	1
Polychromasia	occasional
Prothrombin Time (in sec.)	10.5

TABLE II

URINALYSIS OF A FOUR-YEAR-OLD DOBERMAN BITCH WITH ICTERUS AND ASCITES JUNE 8

Colour	Yellow
Specific Gravity	1.009
pH	6.8
Protein	negative
Glucose	negative
Acetone	negative
Bile	+++
Blood	negative
Epithelial Cells	occasional
Urobilinogen	present at 1:8 dilution

TABLE III

ANALYSIS OF ABDOMINAL FLUID OF A FOUR-YEAR-OLD DOBERMAN BITCH WITH ICTERUS AND ASCITES ON THREE SUCCESSIVE DAYS

Date	June 9	June 10	June 11
Colour	yellow	bloody	bloody
Specific gravity	1.006		1.006
pH	8.0		7.7
Protein	30 mgm		
Glucose	negative		trace
Acetone	negative		
Bile	trace		
Neutrophils	numerous	moderate nos.	numerous
Red Blood Cells	few	numerous	abundant
Mesothelial Cells	moderate nos. some forming acinar-like structures	moderate nos. some forming acinar-like structures	moderate nos. some forming acinar-like structures
Macrophages	moderate nos.	numerous	abundant
Bacteria	absent	absent	absent

TABLE IV

RESULTS OF BLOOD CHEMISTRY ANALYSIS OF A FOUR-YEAR-OLD DOBERMAN BITCH WITH ICTERUS AND ASCITES ON THREE SUCCESSIVE DAYS

Date	June 8	June 9	June 10
Blood urea nitrogen (BUN) (mg%)	6		
Osmolality (mOs/1)			303
Cholesterol (mg%)	128		
Bilirubin Free (mg%)			3.9
Conj. (mg%)			4.5
Total (mg%)			8.4
Serum Glutamic Oxalacetic Transaminase (SGOT) Sigma Frankel Units (SFU)	70		
Serum Glutamic Pyruvic Transaminase (SGPT) Sigma Frankel Units (SFU)	130		116
Alkaline Phosphatase (Alk. Phos.) Bodansky Units (BU)	28.0		27.0
Serum Ornithine Carbamyl Transferase (OCT) Sigma Units (SU)			1375
Bromsulphalein (BSP) Retention			42% at 45 min
Sodium (mEq/1)	161		146
Potassium (mEq/1)	4.2		4.6
Chloride (mEq/1)	109		104
Lipase Sigma Teitz Units (STU)	1.5		
Total Protein (gm%)	6.1	5.7	
Albumin (gm%)	2.5	2.2	
Total Globulin (gm%)	3.6	3.5	
Alpha Globulin (gm%)	0.5	0.5	
Beta Globulin (gm%)	2.3	1.9	
Gamma Globulin (gm%)	0.8	0.8	
Albumin/Globulin (A/G) Ratio	0.7	0.6	

Parasitology

A routine fecal examination revealed the presence of *Ancylostoma* sp. ova.

A clinical diagnosis of chronic idiopathic hepatopathy was made and a poor prognosis was given.

Treatment and Course

The presence of the liver damage precluded treatment for the hookworm infestation. The bitch was placed on supportive treatment consisting of fluid therapy with 2,000 ml of isotonic electrolyte solution[1] over a 24 hour period, oral tetracycline 250 mgm three times daily (t.i.d.), prednisone 0.5 mgm twice daily (b.i.d.) and 250 mgm of a lipotropic agent[2] t.i.d., as well as injectable meperidine.[3] The condition of the bitch deteriorated over the

[1]Normosol, Abbott Laboratories, 861 York Mills Rd., Toronto, Ontario.

[2]Methischol, Arlington Funk U.S. Vitamin Corporation, Division of Pharmaceuticals of Canada Ltd., St. Laurent, Montreal, Quebec.

[3]Demerol, Winthrop, Aurora, Ontario.

next nine days in spite of continued therapy. Euthanasia was performed at the owner's request with intravenous administration of pentobarbital sodium, and a necropsy was performed on June 16, 1971.

Gross Pathology

There was a moderate amount of depot fat present. All tissues were moderately icteric. The peritoneal cavity contained one to two litres of transparent, yellowish fluid.

The heart was rounded, the right ventricle was moderately dilated, and the ventricular wall was thin and partially collapsed. The medial tricuspid valve was slightly thickened.

The liver was shrunken (weight 1 lb, 3 oz) (539 gms), firm, and composed of confluent nodules two to three mm in diameter with occasional nodules one cm in diameter. (Figure 1).

The stomach contained approximately 500 ml of normal ingesta and a considerable amount of grass. Feces in the rectum were black and tarry.

Microscopic Pathology

Sections of kidney, liver, spleen, stomach, small and large intestine, pancreas and brain were fixed in 10% formalin, processed routinely and stained with hematoxylin and eosin for histological examination. Lesions were found only in kidney, liver and brain.

The renal glomerular capsules and tubules contained a moderate amount of eosinophilic, amorphous, proteinaceous material. The tubular epithelium was vacuolated occasionally and in some dilated tubules it was slightly swollen. Tubular epithelial cells contained a small amount of yellowish brown pigment.

The hepatic structure was extremely disorientated. There were large accumulations of connective tissue in periportal regions due to hepatic stromal collapse and to mild interstitial fibrous tissue proliferation (Figure 2). The periportal connective tissue contained increased numbers of bile ducts, occasional small nests of regenerating hepatocytes and large numbers of lymphocytes, plasma cells and plump mononuclear macrophages which frequently contained yellowish brown pigment. The connective tissue divided nodules of hepatocytes into irregularly shaped lobules of varying sizes. The hyperchromatic hepatocytes formed cords of cells which were irregular in thickness and in direction of growth.

Focal accumulations of eosinophilic material which were presumed to be necrotic neurons and swollen axons were present in the vicinity of the gracile nucleus of the brain (Figure 3).

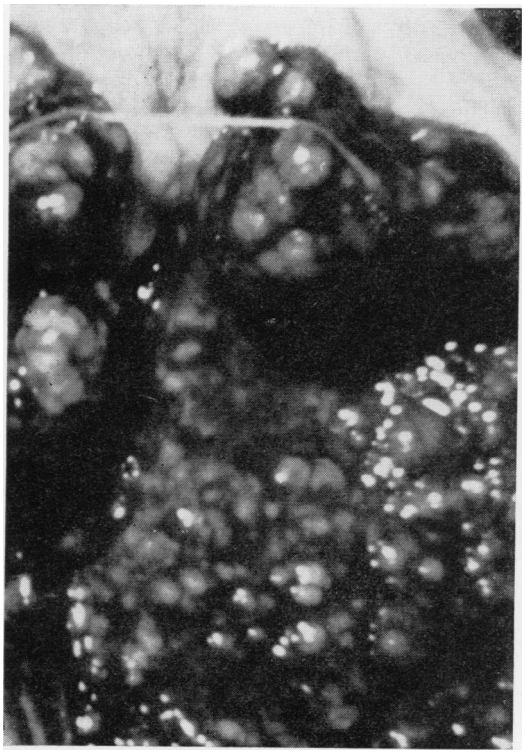

FIGURE 1. The gross appearance of the liver at postmortem. Note the irregularly mottled appearance and the regenerating nodules.

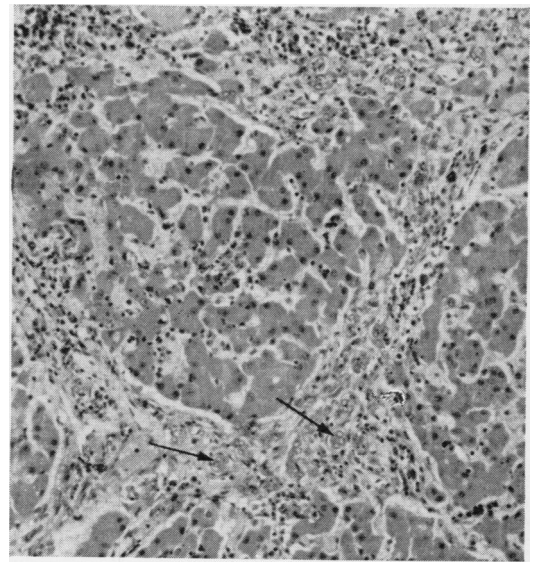

FIGURE 2. Microphotograph of an area of liver showing disorientation of structure with increased amounts of interlobular connective tissue and apparent increased numbers of intrahepatic bile ducts (*arrows*) and accumulations of mononuclear inflammatory cells. H&E ×100.

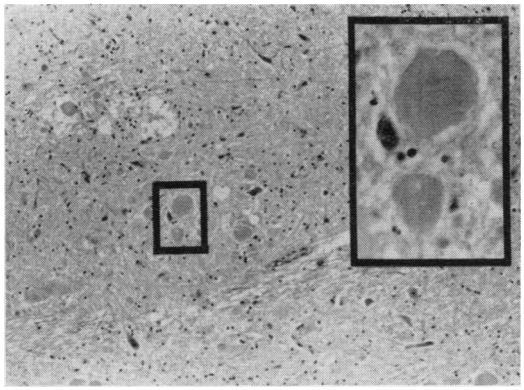

FIGURE 3. Eosinophilic structures in the vicinity of of the gracile nucleus of the brain. Note the vacuoles resulting from lost neurons and axons. H&E ×50. Inset – High power of eosinophilic structures. H&E ×630.

Discussion

The results of hematological examination (Table I) demonstrated an elevated hemoglobin and packed cell volume, likely due to dehydration.

The low urine specific gravity of 1.009 in the presence of the dehydration suggested that there was an inability of the kidney tubules to concentrate the urine. The presence of urobilinogen in the urine at a dilution of one in eight tended to rule out an occluded bile duct.

The ascitic fluid specific gravity of 1.006 with red blood cells, neutrophils, mesothelial cells and macrophages in the absence of bacteria was consistent with a non-septic inflammation caused by fluid accumulation due to inadequate cardiac function.

The low serum cholesterol of 128 mgm%, moderately elevated SGOT of 70 SFu, SGPT of 130 SFu and alkaline phosphatase of 28 Bu were consistent with liver damage of a chronic nature. The markedly elevated OCT of 1375 Su confirmed the presence of a liver lesion. The increased free bilirubin of 3.9 mgm% and conjugated bilirubin of 4.5 mgm%, with the greatly increased BSP retention of 42% at 45 minutes and the low BUN of 6 mgm% were further evidence of the functional impairment of the liver. The elevated serum lipase of 1.5 STu was suggestive of a pancreatic lesion. The total protein of 6.1 and 5.7 gms% was within normal levels but may have been the result of dehydration in a hypoproteinemic dog.

There are several definitions of hepatic cirrhosis (1, 3, 7, 10), most of which describe loss of normal hepatic parenchyma and its replacement by fibrous tissue and nodules of regenerating hepatocytes. An international group (4) has defined hepatic cirrhosis as a disease process:

1. that involves all of the liver but not necessarily all of the lobules.
2. in which cellular necrosis is present.
3. in which nodular regeneration of liver cells is present and
4. in which lobular structure is distorted by bands of connective tissue extending from portal triads to central veins.

The reduced size of this dog's liver, the coarse, irregular scarring and the irregularity in size and shape of parenchymal nodules are typical of the lesions described in post-necrotic cirrhosis in man (5).

A variety of causes may be operative; these are infectious, dietary, toxic and circulatory (5). The history in this case suggests that malnutrition could have been the primary cause or a contributing factor following a primary toxic insult. Mycotoxins have been incriminated as a common cause of chronic progressive hepatic necrosis in dogs (7). Gocke and co-workers (6) have experimentally produced a chronic progressive hepatic disease by infecting partially immune dogs with the virus of infectious canine hepatitis. An infectious cause cannot be ruled out in this case.

The eosinophilic "bodies" which were observed in the gracile nucleus of the brain are thought to be degenerating axon cylinders and/or neurons. The lesion is quite common in dogs of four to five years and older but is uncommon in dogs under one year of age (9). The etiology of this lesion in dogs is unknown. Similar structures have been observed in man and are thought to be a result of the normal aging process (9). Lampert *et al* (8) have described in detail a very similar lesion in the gracile nuclei of vitamin E deficient rats. Perhaps the dog described in this case report lacked adequate vitamin E in its diet or because of its malfunctioning liver, was unable to absorb and/or metabolize any vitamin E which was present in its diet.

Summary

A case of hepatic cirrhosis in a four-year-old Doberman bitch is described. The clinical findings are tabulated and interpreted. The dog failed to respond to supportive therapy and was euthanized. The gross and histopathological findings are recorded. The definition of hepatic cirrhosis and some of the causes of hepatic cirrhosis are discussed.

Résumé

Les auteurs rapportent un cas de cirrhose hépatique, chez une chienne Doberman âgée de quatre ans. Ils illustrent et interprètent leurs observations cliniques. Comme cette chienne ne répondait pas à un traitement de soutien, ils la sacrifièrent. Ils décrivent aussi les lésions macroscopiques et histologiques qu'ils ont observées. Ils commentent la définition de la cirrhose hépatique, ainsi que certaines de ses causes.

Acknowledgments

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